

# Safety Digest

AMC Pamphlet

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**HEADQUARTERS**  
**UNITED STATES ARMY MATERIEL COMMAND**  
**WASHINGTON, D.C. 20315**

AMC Pamphlet 385-96

JULY 1970

The Safety Digest is an AMC Pamphlet prepared by the Safety Office Headquarters, U. S. Army Materiel Command. Its purpose is to disseminate information which can materially influence and improve safety programs at all Command establishments.

Articles are included to supplement technical knowledge as well as practical knowledge gained through experience. They provide a basis for the further refinement of safety measures already incorporated in operating procedures and process layout. To achieve maximum effectiveness, the Safety Digest should be given widespread circulation at each AMC establishment.

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Unclassified material believed to be of interest or benefit to other establishments is welcome for publication in the Safety Digest. Please send articles for review to: U. S. Army Materiel Command Field Safety Agency, Charles-town, Indiana. If possible, include pictures, charts, drawings, and illustrations that clarify and heighten interest in your presentation.

AMCSF

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## ONE AND ONE-HALF SECONDS

Mark A. Grogan, Industrial Engineer  
Plans and Analysis Directorate  
US Army Mobility Equipment Command

■ We have read of chain reactions in nuclear fission and are worried about adequate controls to permit scientists to stop the reaction when necessary. Have you ever thought about chain reaction automobile accidents? Do you tailgate? If you do your chances are very good that you will learn about chain reactions real soon.

We all have heard of the old rule of thumb of allowing one car length between your auto and the car ahead for each 10 miles per hour you are traveling. The problem is how does one measure six car lengths while driving 60 miles per hour, especially at night?

For safety's sake (and your life) we have compiled a simple graph for use in determining your rating while driving on the highway. Many of us are not aware of some of our worse driving habits, so by reviewing this chart we may find how we rate as a driver.

The chart is plotted in driving speed, or miles per hour on the left edge. The lower scale is marked in distance, or feet. The top edge is also in distance, but shows car length for use in judging how you drive. The chart is shaded in five colors ranging from black border (death is near), to red for tailgaiters, yellow indicating cautious driving is required, and green as the normal safe driving area. The blue area is for wet, slippery or hazardous road conditions. In other words, under these conditions extend your interval.

You will note that the time line of "One and One-Half Seconds" is the start of the safe driving range. The time range is determined by measuring the time interval between when the car ahead of you goes past a selected post, marker, corner, or any visible object and when your car passes this same selected object or spot. We plotted the distance traveled at a given speed and noted that with a "One and One-Half Seconds" time interval, no matter what speed you are traveling you will be maintaining the basic rule of one car length for each 10 miles per hour.

An example of how the chart works can be seen by the assumption of a speed of 30 miles per hour on the left column, projecting across to the "One and One-Half Seconds" line, then reading vertically. Three car lengths are shown as the distance between your car and the one ahead

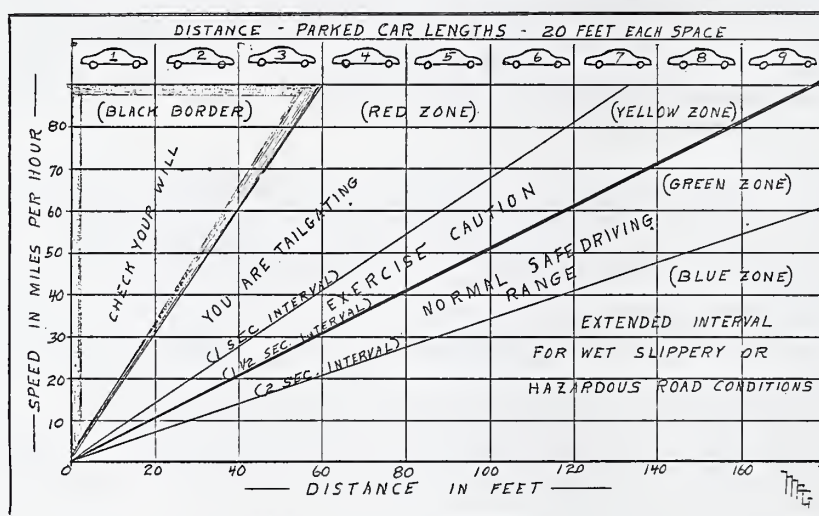
of you. Assume your speed is 55 miles per hour, by projecting over and up you see five and one-half car lengths to the car ahead.

The chart shows that safety starts at the "One and One-Half Seconds" time interval between you and the car ahead. How do you measure off the seconds? There are many ways such as using a sweep second hand of a watch. But if you do, they will be sweeping the remains off the highway. The old but reliable way of measuring time by counting, "one thousand one, one thousand two, etc." is good, but how does one divide this into half a second?

If you didn't read the title of this article, or you have forgotten it, turn back to the start and re-read it. This title is the answer how to measure "One and One-Half Seconds". By remembering the title and saying it when you check your distance from the car ahead you are maintaining the proper interval if you pass the check point as you complete the word "seconds". If you passed sooner you should drop back to the correct interval. By doing this you would be able to stop a chain reaction accident from continuing to and on past your car.

#### DRIVING TEST - INTERVAL CHECK

TIME INTERVAL is Shown in Seconds Elapsed From When the Car Ahead of You Passes an Object or Point and When You Pass the Same Stationary Object or Point With Your Car.



## SAFETY PAYS OFF IN CASH

### Milan Army Ammunition Plant

Safety and high quality performance pay off at the Milan Army Ammunition Plant, not only in safety for the employee, but it also results in the saving of cash to the U. S. Government.

Harvey Aluminum Sales, Inc., the contractor-operator of the installation for the Army, is required to carry Workmen's Compensation, Automotive and Bodily Injury, and General Liability Insurance. The premiums paid are based on the number of employees and the category of employment into which each employee falls. Periodically the insurance carrier, who bases his action upon an experience rating, refunds a part of the premium paid if this is warranted by the plant's safety record.

Harvey Aluminum Sales, Inc., recently received a check from its insurance carrier in the amount of \$363,258.43. This represented a refund of premiums based on a favorable accident experience rating covering a one-year period.

The outstanding Safety, Security and Zero Defects Programs in effect at the Milan Army Ammunition Plant have resulted in over \$950,000 of the premiums paid being refunded during recent years. This money has, in turn, been used to reduce the cost of operations at the plant, and it has been a direct savings of tax dollars. Every employee of the installation helped achieve this saving.

This is considered to be an outstanding achievement, especially when consideration is given to the fact that thousands of tons of explosive materials are handled annually.

Safety and quality of work are foremost factors at the Milan Army Ammunition Plant and are stressed to the employee daily. Both on-the-job and off-the-job safety are emphasized. The results have been greater safety for the individual and cash to "Uncle Sam".

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## WAKE TURBULENCE

Representatives of the U.S. Government and industry participated in intensive tests designed specifically to investigate the wake turbulence phenomena. These tests were completed on 21 February 1970. Test data indicate that all aircraft capable of takeoff at weight of 300,000 pounds or more generate significantly greater wake turbulence than other aircraft. PAA NOTAMs FDC 0/64, FDC 0/171, and FDC 0/199 were used in the preparation of the following advisory material:

### DEFINITION:

a. Examples of aircraft which are capable of takeoff at weights of 300,000 pounds or more are: Boeing 747, C5A, DC-8-60 series, Intercontinental DC-8, Intercontinental B707, VC-10, IL62, C-141, B-52, VC-137, and EC-135. These aircraft are defined as "heavy jets" for the purpose of this notice.

b. Because of the greater wake turbulence generated by these "heavy jets", all pilots should:

(1) Review material in Airman's Information Manual, Part one, pertaining to wake turbulence.

(2) Avoid flight within five miles behind a heavy jet when operating at the same altitude or within less than 1000 feet below.

(3) Use extreme caution when taxiing behind a heavy jet. Static test data indicate that the area of concern is within 750 feet behind the tail of the heavy jet aircraft.

(4) When operating in the same environment VFR as a heavy jet and being provided radar sequencing-vector, pilots can expect to be vectored at least five miles behind the heavy jet. Pilots not being provided radar sequencing-vectors are expected to maintain adequate spacing to ensure that wake turbulence problems are not encountered.



Still of concern and not covered in these tests is the group of aircraft whose weights fall below 75,000 to 80,000 pounds including light general aviation airplanes. Follow-on tests are being conducted. Additionally, test data indicate potential wake turbulence problems may exist when parallel runways separated by less than 3500 feet are being used by any four engine jet aircraft. Pilots should be aware that there is a likelihood that, under crosswing conditions, the wake turbulence created on one runway will drift across and affect operations on the other runway. Pilots should exercise caution when such conditions exist. Advisory material on this phase of the wake turbulence problem will be issued as studies are completed.

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### SAFETY SHOE CROSSES UP CROSS BRACE

Lyle D. Soltau, Safety Inspector  
Atlanta Army Depot

Wearing his safety shoes at all times while at work prevented severe injury to the right foot of John Morgan, a lead foreman at the Atlanta Army Depot.



Mr. Morgan, along with several personnel in his department, was attempting to move a large conveyor into a permanent position. As those on the opposite side of the conveyor were lifting and pushing, Mr. Morgan, with an employee on his side, was lifting and pulling.



When the conveyor was in position and employees released it, the cross brace (see photo 1) came to rest on Mr. Morgan's safety shoe. The leather was cut to the steel cap, which was dented slightly, but his toes were saved from injury. The weight of the end of the metal roller conveyor was about 350 lbs.

## COFFEE, TEA AND SAFETY

CW2 John M. Leake  
Aviation Safety Officer  
US Army Arctic Test Center

Know what a PPB is? Well, you can bet your Bippy you don't want to bet your PPB. Any flight without a PPB (Passenger Preflight Briefing) is a gamble; not only with the pilot and crew's safety, but also with the well-being of the passengers.

Next time you're flying commercially, and you've got that good looking wisp of a stewardess cornered in the back cabin showing her your wings and talking of the real world of flying, ask her about PPB. She may just relinquish a few of her secrets and send you along your way, positive that you can keep your passengers just as content.

The history of the PPB extends back to the dawning period of aviation. The first record being that of a PWB (Post Wreck Briefing). This PWB was conducted when an enterprising pilot realized just how many doors it could open to his future, especially the one he was trapped behind when his airplane crashed. A little late was better than never, and it stood as a good moral for future aviators: "A PPB before leaving the ground is worth gold if the airplane goes down."

The PPB has developed through the years in a direct relationship with the progress made in the field of aviation. Confrontation, however, has been the best teacher of the importance of the PPB. Every Army aviator has been confronted with at least one example of a passenger pulling a disabled crewmember out of a burning plane, or the safe unloading of a crowded plane in an emergency. Incidents of this nature are frequent, but just one case of life over death is enough to justify the value and need for a good PPB for every flight.

Certain items are standard in all PPB's, while the flight envelope and characteristics of the airplane will determine specific items. However, all PPB's should be oriented around the need of the passenger.

- Position for Impact
  - Proper body position to assume prior to impact is determined by type aircraft, fixed or rotary wing.

- Aid Kits
  - Number and location of aid kits
- Seatbelts
  - Correct tightness for seat-belt and times when it must be worn in Army aircraft; passengers should remain belted in at all times, if possible.
- Smoking Procedure
  - Permissible limits for smoking in or around an aircraft.
- Exiting Procedure
  - Number and location of all emergency exits, i.e., window exits, etc.; proper method of releasing jettison handles, and proper procedure for exiting the aircraft in an emergency.
- Number and Location of Fire Extinguishers.
- Ground Safety
  - Proper procedures to be used during aircraft ground operations, to include entering and exiting of aircraft. Specific danger areas should be pointed out, especially around helicopters.
- Emergency Survival Gear
  - The climatic extremities under which TECOM aircraft operate require pilots to insure passengers realize the importance of special survival gear. This should include the procedure for removing secured gear from the aircraft.
- Remain Calm
  - This should be stressed more than any other point. The PPB is of little use unless all personnel are conditioned to adhere to the instructions in an emergency situation.

■ Only Instinctive Reactions stemming from a proper and thorough briefing can insure safe rescue in an emergency situation. As for the pilots, many emergency situations leave little time to think or ask the question, "What am I to do?"

The above items are a general outline of what should be covered for flights in all aircraft. In addition, the type of airplane will determine if the use of oxygen, bail-out procedures, etc., will be included.

A PPB however, is not completed by the sum of its parts. There is an intangible portion which can easily be the deciding factor of its effectiveness. This is the portion of the PPB which the aviator chooses to share with his passengers. The majority of the passengers carried in Army aircraft have little knowledge of aviation in general and the aircraft in particular. In order to maintain their equanimity under all circumstances, the aviator must take the time with his PPB to explain all questions and dispel any doubts.

Add the PPB to your before flight checklist. Brigadier General W. W. Spruance of the Delaware Air National Guard in his film "The Will to Live" said, "It is always better to be happily surprised by an uneventful flight than unhappily surprised by an emergency." Don't allow your passengers to be unhappily surprised. Remember the margin of safety for crew and passengers in the event of an emergency: a good PPB, "Passenger Preflight Briefing." A real crowd pleaser. You can bet your PPB your passengers will appreciate it.

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## SUMMER

Sure it's true that blue skies and balmy breezes are the popular trademarks of summer weather. But those of you who almost daily fly the skies from coast-to-coast must be ever-mindful that many severe flying hazards can and do exist during the summer season.

Typical summer weather elements that most often contribute to aircraft accidents are thunderstorms, hail, rain, surface winds and turbulence. In addition to these is blowing dust -- a byproduct of these weather phenomena which has caused its share of grief to many unsuspecting pilots.

Certain weather conditions are usually prevalent in certain parts of our country. For example, thunderstorms most frequently occur over the states bordering the Gulf of Mexico, over the Ohio, Missouri, and Mississippi River Valleys, and along the eastern edge of the Rockies. In Texas, gusty surface winds frequently prevail during thunderstorms. Low ceilings and visibilities are the primary weather problems facing pilots flying over the New England and mid-Atlantic coastal states, the Seattle area, and the coastal region of Southern California, specifically Los Angeles. Certain industrial regions in Ohio River Valley are also susceptible to these foggy conditions. Ceilings and visibilities tend to be lowest during the hours from midnight to 0900.

As a matter of record, most "weather" accidents during June, July, and August occur in the Great Plains States, from Texas to Canada -- 56 percent to be exact. The region west of the Continental Divide recorded only 9 percent, and the balance of the nation recorded the remaining 35 percent.

The high summertime accident rate in the Plains States is, of course, attributable to thunderstorms and associated weather. Almost all pilots are familiar with the frequent occurrence of thunderstorms over the south-eastern part of the country. On the other hand, most pilots are relatively ignorant of the fact that thunderstorms occur with equal frequency over the Plains States and along the eastern edge of the Rocky Mountains. Therefore, knowledge makes them reluctant to fly into the southeast during thunderstorm season; at the same time, however, lack of knowledge gives pilots no qualms about flying over the Plains States. The case is simply one of not foreseeing the true picture and, as a result, not being prepared to meet the situation.

Another major hazardous weather condition for fliers is rain. Wet runways, rain-blurred windshields and other obstructions to visibility are direct causes of many airplane accidents. The majority of such accidents occur east of the Appalachian Mountains.

Always a problem in summer is the effect of high temperature on air density, which in turn greatly affects the takeoff of aircraft. A condition of high temperature and low air density can exist anywhere in the nation. So check that takeoff carefully, because the combination of heat and high field elevation can really be hairy to the unsuspecting pilot.

And now a word of warning. The facts and figures presented are based on past occurrences and averages. We have outlined the areas of maximum occurrence of certain weather elements. However, under certain conditions, any element could be encountered over any portion of the country. To plan your individual flights, check with the forecaster at your local weather station. He has the latest information available and will do his best to help you.

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### PUEBLO ARMY DEPOT WINS NSC AWARD OF MERIT

Pueblo Army Depot has received a National Safety Council Award of Merit for its FY 1969 accident prevention program. Shown with the award plaque are Donald T. Meyer, Safety Director, and COL John T. Andrews, Jr., Commanding Officer of Pueblo Army Depot. Mr. Meyer was a member of the FY 1967 Safety Career Management Intern Program class and is representative of the younger safety personnel who are rising to positions of responsibility within AMC.



## BUGS AND BITES

The grounds superintendent of an Illinois country club recently was stung on the thigh by a bee while working on the club's golf course. Ten or 15 minutes later two groundskeepers found him on the 16th green - unconscious. He died a few hours later at the hospital from an allergic reaction to bee venom.

Bees kill more people in this country than any other venomous creature. A 10-year study of 460 deaths from bites or stings shows that the insect group Hymenoptera (bees, wasps, hornets, ants) caused 50 per cent of these fatalities. Snakes caused 30 per cent, spiders 14 per cent, and scorpions 2 per cent of the deaths.

The number of fatal or near-fatal cases due to allergic reaction is increasing. Fortunately, the first allergic reaction will not be fatal and usually provides a warning to the victim.

A bee sting usually leaves only a painful swelling that will go away in a few hours. But an allergic reaction to insect venom can vary from dizziness to headaches, from abdominal cramps to extreme nausea, from itching to death. Difficulty in breathing, hives and swelling in a spot different from the location of the sting are also warning signs of an allergy. A doctor should be seen immediately for proper immunization.

Once a person is sensitized to the venom of one kind of Hymenoptera, he will be allergic to the sting of them all.

There are measures a person can take to avoid being stung. Sweet smells attract bees, so avoid strong perfumes and hair sprays, hair tonics and sun tan lotion. Floral fragrances in particular seem attractive.

Brightly colored clothing or flowery prints and black or dark colors seem to anger insects, according to some experts, so wear dull white, dark green or khaki for outdoor activities, and always wear shoes.

Uncovered food attracts bees as well as other insects. Keep food covered if possible and don't leave garbage in uncovered containers.

When a bee is around, avoid swift movements. If a bee lands on you, by all means don't slap at it as you would a fly or mosquito. A bee won't sting unless threatened.



Fatal reactions to Hymenoptera stings are more frequent among adults than children. Of the 229 deaths from Hymenoptera stings mentioned previously, only 7 per cent of the victims were under the age of 20 while 80 per cent were over age 30. The rise in fatalities with age may be due to the fact that allergic reactions to insect stings are cumulative. The first sting sensitizes and subsequent encounters cause increasingly severe reactions.

On the other hand, the bite or sting of creatures such as the scorpion and the brown recluse spider is more fatal to children than adults. Even a small amount of venom can have an immediate and deadly effect when the victims are little.

Reactions to bites vary with individuals, too. Some people don't feel chigger bites, while others get watery lesions and even fever from them. Most people are not bothered by a bedbug bite but it may be very irritating to others.

Sometimes the danger is not from the bite itself but from the secondary infection that may develop if the bite is not properly treated. Mosquito, bedbug and tick bites aren't very painful, but they can spread serious diseases, and infection from scratching or other contamination can be troublesome.

A tick can also produce a rare condition - paralysis leading to death. A healthy 4-year-old girl in Tennessee awoke one morning unable to coordinate the movements of her arms and legs. While administering neurological tests at the hospital, doctors discovered a common wood tick on her head. Two hours after it was removed she was able to walk across the room. She quickly returned to normal. Mysteriously, removal of the tick cures the paralysis.

Other creatures have reputations they don't deserve and perhaps ought to be reclassified as "bugaboos" only. The tarantula of the Southwestern U.S., for example, is feared by many for its "poisonous" bite, which is no more dangerous or painful than a pin prick. The American tarantula isn't even a spider - it's a tailless whip scorpion.

True scorpions can be dangerous, though. The venom of two species of scorpions found in Arizona and adjacent areas is lethal. It attacks the nervous system, causing convulsions that can lead to death. The victim is easily misled about the seriousness of the sting because it does not produce swelling or discoloration, although the area will become abnormally sensitive.



With the exception of these two Southwest species, the venom of most scorpions causes the flesh to swell and discolor. A 60-year-old man in Miami, Florida, was stung by a scorpion that he tried to pick up with only a facial tissue in his hand. His arm became swollen and paralyzed. He said later it was the most painful thing that had ever happened to him. Although frightening, this kind of sting is not fatal.










If you are stung or bitten on an extremity by any venomous insect-like creature, you should immediately make a tourniquet and place it between the bite and the trunk of the body - as near the bite as possible. Do not twist the tourniquet tight enough to cause pain or stop the flow of blood. Do not keep it so tight that the pulse below the tourniquet stops or a throbbing sensation appears above it. This lightly applied tourniquet will help slow down the spread of the venom until a doctor can be reached. Do not take any pain-killing drugs; they increase the venom's lethal power.

Of course, your best protection is to avoid being bitten. Know your "bugs" - what they look like, where to find them, and how to avoid them. Consult your local extension service for pesticide information.










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Carol Clifton - Family Safety - Spring 1970



	DESCRIPTION	HABITAT	PROBLEM
 <p><b>CHIGGER</b></p>	Oval with red velvety covering. Sometimes almost colorless. Larva has six legs. Harmless adult has eight and resembles a small spider. Very tiny—about 1/20-inch long.	Found in low damp places covered with vegetation: shaded woods, high grass or weeds, fruit orchards. Also lawns and golf courses. From Canada to Argentina.	Attaches itself to the skin by inserting mouthparts into a hair follicle. Injects a digestive fluid that causes cells to disintegrate. Then feeds on cell parts. It does not suck blood.
 <p><b>BEDBUG</b></p>	Flat oval body with short broad head and six legs. Adult is reddish brown. Young are yellowish white. Unpleasant pungent odor. From 1/8 to 1/4-inch in length.	Hides in crevices, mattresses, under loose wallpaper during day. At night travels considerable distance to find victims. Widely distributed throughout the world.	Punctures the skin with piercing organs and sucks blood. Local inflammation and welts result from anticoagulant enzyme that bug secretes from salivary glands while feeding.
 <p><b>BROWN RECLUSE SPIDER</b></p>	Oval body with eight legs. Light yellow to medium dark brown. Has distinctive mark shaped like a fiddle on its back. Body from 3/8 to 1/2-inch long, 1/4-inch wide, 3/4-inch from toe-to-toe.	Prefers dark places where it's seldom disturbed. Outdoors: old trash piles, debris and rough ground. Indoors: attics, storerooms, closets. Found in Southern and Midwestern U.S.	Bites producing an almost painless sting that may not be noticed at first. Shy, it bites only when annoyed or surprised. Left alone, it won't bite. Victim rarely sees the spider.
 <p><b>BLACK WIDOW SPIDER</b></p>	Color varies from dark brown to glossy black. Densely covered with short microscopic hairs. Red or yellow hourglass marking on the underside of the female's abdomen. Male does not have this mark and is not poisonous. Overall length with legs extended is 1 1/2 inch. Body is 1/4-inch wide.	Found with eggs and web. Outside: in vacant rodent holes, under stones, logs, in long grass, hollow stumps and brush piles. Inside: in dark corners of barns, garages, piles of stone, wood. Most bites occur in outhouses. Found in Southern Canada, throughout U.S., except Alaska.	Bites causing local redness. Two tiny red spots may appear. Pain follows almost immediately. Larger muscles become rigid. Body temperature rises slightly. Profuse perspiration and tendency toward nausea follow. It's usually difficult to breathe or talk. May cause constipation, urine retention.
 <p><b>SCORPION</b></p>	Crablike appearance with clawlike pincers. Fleshy post-abdomen or "tail" has 5 segments, ending in a bulbous sac and stinger. Two poisonous types: solid straw yellow or yellow with irregular black stripes on back. From 2 1/2 to 4 inches	Spends days under loose stones, bark, boards, floors of outhouses. Burrows in the sand. Roams freely at night. Crawls under doors into homes. Lethal types are found only in the warm desert-like climate of Arizona and adjacent areas.	Stings by thrusting its tail forward over its head. Swelling or discoloration of the area indicates a non-dangerous, though painful, sting. A dangerously toxic sting doesn't change the appearance of the area, which does become hypersensitive.
 <p><b>BEE</b></p>	Winged body with yellow and black stripes. Covered with branched or feathery hairs. Makes a buzzing sound. Different species vary from 1/2 to 1 inch in length.	Lives in aerial or underground nests or hives. Widely distributed throughout the world wherever there are flowering plants—from the polar regions to the equator.	Stings with tail when annoyed. Burning and itching with localized swelling occur. Usually leaves venom sac in victim. It takes between 2 and 3 minutes to inject all the venom.
 <p><b>MOSQUITO</b></p>	Small dark fragile body with transparent wings and elongated mouthparts. From 1/8 to 1/4-inch long.	Found in temperate climates throughout the world where the water necessary for breeding is available.	Bites and sucks blood. Itching and localized swelling result. Bite may turn red. Only the female is equipped to bite.
 <p><b>TARANTULA</b></p>	Large dark "spider" with a furry covering. From 6 to 7 inches in toe-to-toe diameter.	Found in Southwestern U.S. and the tropics. Only the tropical varieties are poisonous.	Bites produce pin-prick sensation with negligible effect. It will not bite unless teased.
 <p><b>TICK</b></p>	Oval with small head; the body is not divided into definite segments. Grey or brown. Measures from 1/4-inch to 3/4-inch when mature.	Found in all U.S. areas and in parts of Southern Canada, on low shrubs, grass and trees. Carried around by both wild and domestic animals.	Attaches itself to the skin and sucks blood. After removal there is danger of infection, especially if the mouthparts are left in the wound.



SEVERITY	TREATMENT	PROTECTION	
Itching from secreted enzymes results several hours after contact. Small red welts appear. Secondary infection often follows. Degree of irritation varies with individuals.	Lather with soap and rinse several times to remove chiggers. If welts have formed, dab antiseptic on area. Severe lesions may require antihistamine ointment.	Apply proper repellent to clothing, particularly near uncovered areas such as wrists and ankles. Apply to skin. Spray or dust infested areas (lawns, plants) with suitable chemicals.	 CHIGGER
Affects people differently. Some have marked swelling and considerable irritation while others aren't bothered. Sometimes transmits serious diseases.	Apply antiseptic to prevent possible infection. Bug usually bites sleeping victim, gorges itself completely in 3-5 minutes and departs. It's rarely necessary to remove one.	Spray beds, mattresses, bed springs and baseboards with insecticide. Bugs live in large groups. They migrate to new homes on water pipes and clothing.	 BEDBUG
In two to eight hours pain may be noticed followed by blisters, swelling, hemorrhage or ulceration. Some people experience rash, nausea, jaundice, chills, fever, cramps or joint pain.	Summon doctor. Bite may require hospitalization for a few days. Full healing may take from 6-8 weeks. Weak adults and children have been known to die.	Use caution when cleaning secluded areas in the home or using machinery usually left idle. Check firewood, inside shoes, packed clothing and bedrolls — frequent hideaways.	 BROWN RECLUSE SPIDER
Venom is more dangerous than a rattlesnake's but is given in much smaller amounts. About 5 per cent of bite cases result in death. Death is from asphyxiation due to respiratory paralysis. More dangerous for children, to adults its worst feature is pain. Convulsions result in some cases.	Use an antiseptic such as alcohol or hydrogen peroxide on the bitten area to prevent secondary infection. Keep victim quiet and call a doctor. Do not treat as you would a snakebite since this will only increase the pain and chance of infection; bleeding will not remove the venom.	Wear gloves when working in areas where there might be spiders. Destroy any egg sacs you find. Spray insecticide in any area where spiders are usually found, especially under privy seats. Check them out regularly. General cleanliness, paint and light discourage spiders.	 BLACK WIDOW SPIDER
Excessive salivation and facial contortions may follow. Temperature rises to over 104°. Tongue becomes sluggish. Convulsions, in waves of increasing intensity, may lead to death from nervous exhaustion. First 3 hours most critical.	Apply tourniquet. Keep victim quiet and call a doctor immediately. Do not cut the skin or give pain killers. They increase the killing power of the venom. Antitoxin, readily available to doctors, has proved to be very effective.	Apply a petroleum distillate to any dwelling places that cannot be destroyed. Cats are considered effective predators as are ducks and chickens, though the latter are more likely to be stung and killed. Don't go barefoot at night.	 SCORPION
If a person is allergic, more serious reactions occur—nausea, shock, unconsciousness. Swelling may occur in another part of the body. Death may result.	Gently scrape (don't pluck) the stinger so venom sac won't be squeezed. Wash with soap and antiseptic. If swelling occurs, contact doctor. Keep victim warm while resting.	Have exterminator destroy nests and hives. Avoid wearing sweet fragrances and bright clothing. Keep food covered. Move slowly or stand still in the vicinity of bees.	 BEE
Sometimes transmits yellow fever, malaria, encephalitis and other diseases. Scratching can cause secondary infections.	Don't scratch. Lather with soap and rinse to avoid infection. Apply antiseptic to relieve itching.	Destroy available breeding water to check multiplication. Place nets on windows and beds. Use proper repellent.	 MOSQUITO
Usually no more dangerous than a pin prick. Has only local effects.	Wash and apply antiseptic to prevent the possibility of secondary infection.	Harmless to man, the tarantula is beneficial since it destroys harmful insects.	 TARANTULA
Sometimes carries and spreads Rocky Mountain spotted fever, tularemia, Colorado tick fever. In a few rare cases, causes paralysis until removed.	Apply heated needle to tick. Gently remove with tweezers so none of the mouthparts are left in skin. Wash with soap and water; apply antiseptic.	Cover exposed parts of body when in tick-infested areas. Use proper repellent. Remove ticks attached to clothes, body. Check neck and hair. Bathe.	 TICK

## EASY ACCESS TO A TANK CAR DOME

Richard E. Powell, Area Safety Engineer  
Mason & Hanger - Silar Mason Co., Inc.  
Cornhusker Army Ammunition Plant

Are you tired of headlines like these? "Worker Seriously Injured" "Employee Seriously Injured in Fall From A Railroad Car". The story goes on to say that the employee was using standard equipment and accepted procedure, and, even so, he fell approximately 12 feet from the top of a tank car. Would you rather be known as having a safe place to work?

A thorough investigation of this case revealed that the only extraneous factor involved was ice on one side of the top catwalk. In many areas this possibility must be taken into consideration for outside work six months out of the year.

It was necessary to look further into the situation to determine whether some modification could be made to alter the basic pattern of requirements. A study was made, applying the basic concepts of human factors engineering. The study revealed that in order to reach all of the hold-down dogs on the vent a worker must step up from the catwalk across a 54-inch span onto a curved surface. (See Photos 1, 2 and 3.) At the same time, he must swing around the dome, and there are no grab irons to hold. To make matters worse, the catwalk from which he must step is only eight inches wide. Moreover, he must accomplish this maneuver four times on each occasion that he opens or closes the vent. These circumstances, even with the best weather conditions, demands the worker to exercise utmost caution while he is in an awkward position. During wet weather and icing conditions the inherent hazards are multiplied enormously.

The problem requires hazard reduction or elimination in two areas:

1. Reduce the span necessary to step from the catwalk to the top of the car.
2. Reduce the hazard of swinging around the dome.



Solutions that present themselves immediately include installation of grab irons around the top of the dome and attaching cleats from the catwalk to the top of the car. These ideas cannot be used. Because this is a commercial car, any permanent modifications to it must be rejected. Moreover, a permanent type dock and ramp at dome level is not economically feasible because of limited use.

A portable ladder was devised which locks onto the existing grab irons on a car. This ladder gives access on to the top of the dome, which is virtually flat. It completely eliminates the need to cross the wide span and to swing around the dome. It also eliminates the need for maneuvering and working on a curved surface. Furthermore, it is economically acceptable as it only costs \$25.00 to fabricate. Only one ladder is needed as it is adaptable to any standard tank car and is portable. (See Photos 4 and 5.)

This solution was deemed to be the most satisfactory from the standpoints of both efficiency and practicality. With the ladder the worker can judge the suitability of his working surface while he still has a handrail to hold. He need not overreach his balance in order to complete his task. He is, therefore, reasonably safe from slipping and falling even during the most severe weather conditions.

The standard commercial tank car provides, at best, difficult access to the vent on top of the dome.



← After reaching the top catwalk, the worker must stretch across a 54" span to the top of the car

No hand holds are provided for the worker while he swings around the dome.



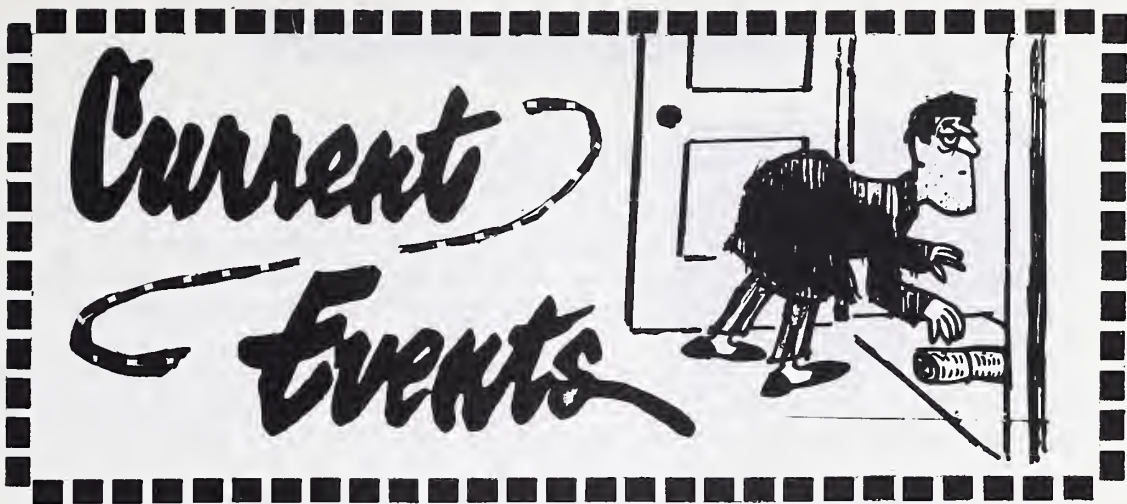
A new ladder designed and fabricated locally locks into position on existing grab irons on the tank car.

The ladder provides easy access on and off the car directly from the dome.



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Photography by William E. Sass, Safety Engineer, Mason & Hanger - Silas Mason Co., Inc.



### HOLSTER INSPECTED - GUARD SHOT

A civilian guard was performing his assigned duties at a gate of an Army installation. Another guard, who was assigned to patrol duty, stopped at the gate at 0400 hours. It was very quiet at this early morning hour and the two men passed some time talking.

During their conversation they decided to examine the gate guard's holster. The man removed his pistol, a Smith and Wesson .38 caliber, and unloaded it. The holster was then examined.

When the examination of the holster was completed, the guard pulled the trigger of his empty revolver two or three times. He then reloaded the weapon and started to return it to his holster. As he was inserting it into the holster, the pistol discharged.

The bullet entered the guard's right leg near his knee, coursed downward and lodged in the skin low in the leg. His "superficial wound" caused him to be absent from work for a week.

The guard was not certain whether he pulled the trigger or whether the hammer of the revolver caught on the holster and caused the weapon to discharge. His suggestion that a caught hammer fired the weapon was discounted by his supervisor. Investigation revealed that the trigger must be pulled on the double action revolver in order to fire it.

The guard was given a one-day suspension from work. All members of the plant security organization were required to attend lectures on the importance of safe fire-arm practices.

## THE SIGNAL WENT UNSEEN

Empty tank cars were being switched by a plant locomotive. Six cars were pushed onto a siding where 15 empty cars had been placed for temporary storage. The brakeman, who had been riding on the leading car, descended and coupled this car to the first of the stored cars. He then signaled the engineer to move forward.

The brakeman gave his signal without making certain he had placed himself in a position to see the end of the train, which now contained a locomotive and 21 cars.

Another worker who was acting as conductor had taken a position on a roadway near the end of the spur track. He now saw the train approaching the end of the spur. He signalled to stop. The brakeman could not see and pass on the signal, and the engineer failed to see it. The lead car crashed into the ramp and was damaged. (See photograph.)



All personnel assigned to plant train crews were given personal and intensive fresh instruction on where and how to position themselves to perform positive and correct control of train movements.

It was made clear that disciplinary action would follow failure to comply with procedures covered by the instruction.

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## HE OPENED THE DOOR WITHOUT LOOKING INSIDE

A warehouse forklift operator at an Army installation was preparing to unload bogie wheels from a railroad car. He removed the car door seal, moved into position beside the single door, and pulled on the door handle. The door moved.

When the door was about halfway open a bogie wheel fell out of the car and struck the worker. The wheel was about 25 1/2 inches in diameter by 4 1/2 inches wide, and



it weighed approximately 100 pounds. The blow produced a fracture of the man's left ankle and disabled him for two months.

Inspection revealed that the cargo had been inadequately braced and blocked by the shipper. Some of the metal strapping broke and many of the loose bogie wheels shifted about within the car. (See photo.) The shipper was given a notification of this condition.



The installation's railroad car opening procedure was revised to include the use of a car door puller.

Workers were instructed to look inside the car after opening the door a short distance. This should permit them to detect the likelihood of objects falling when the door opening proceeded.

The accident was publicized throughout the installation.

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### TWO CONFIDENT DRIVERS MEET AT CROSSING

In the early evening an Army carryall, with three passengers, was being driven by an Army contractor employee. The route led across an installation railroad to an intersection on another street. The railroad crossing was posted with a stop sign, but the vehicle driver proceeded into the crossing without halting or looking carefully down the track in each direction.

One of the locomotives used on the plant railroad was a 10-ton Jitney. The locomotive was en route from a refueling point to an area where it was usually operated. Its operator drove it into the crossing just as the carryall started across and struck the right side of the Army vehicle.

Both vehicles were moving at moderate speeds, and injuries and damage were not severe. Two carryall passengers reported arm, chest, side and back injuries, but these were not disabling. Damage to the Army motor vehicle was estimated at \$350.

Responsibility for the accident was fixed upon both vehicle operators. The carryall driver had failed to obey the stop sign and driven in front of the locomotive. It was established by the carryall passengers and other witnesses that the Jitney was being operated without lights. Neither the Jitney horn nor its bell was sounded before it moved into the crossing.

The operators of both vehicles were given three days suspension without pay for failure to operate their equipment in a safe and alert manner and for ignoring established plant rules.

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### FUMES TOPPLE WORKER FROM TANK CAR

Two Army contractor employees were preparing to unload liquid sulfur from a tank car. Many hours earlier steam had been applied to warm the sulfur. A vent on the car had been opened, but the cover of the tank car dome had not been loosened, as was required by the plant's production standing operating procedure.

The two men placed a funnel over the pit underneath the car. One worker then left to perform another job while the other mounted the tank car. When he reached the top, he began to loosen the bolts on the cover. This was done from a permanently installed work platform, complete with a 30-inch high guardrail and ladders, that was a part of the tank car.

A chief operator of a nearby building saw the man working on top of the tank car and noticed he had the cover partially open. The operator then entered a building, washed his hands and came outside again. The worker was missing from the top of the tank car. The operator discovered him lying on the ground, calling for help.

An ambulance was called and the worker was moved to a hospital. His injuries were found to include a compound fracture of the femur of the right leg and multiple fractures of facial bones. He was expected to be away from work for several weeks.

The man was conscious after the fall, but he could not supply a complete story of what had happened. Investigation led to the conclusion that he was affected by fumes blown toward him from the car's vent and partially opened cover. He had realized he was being affected by these and he started to leave the platform. He could

not remember reaching the ladder and his position after the fall indicated he did not. The nature of his facial injuries and the lack of substantial lacerations, suggested he had toppled over the 30-inch high guardrail.

The hazardous fumes expelled from the vent and partially opened cover contained hydrogen sulfide. Some physical condition or the strain of working in a squatting position may have made the man hypersensitive to the fumes at the moment of his seizure. His consciousness immediately after his fall was thought to support this conclusion.

Indirect causes of the accident were considered to be poor immediate supervision and inadequate written procedure coverage. An interface of responsibility between production and maintenance groups had obscured the inadequacy of written instructions.

The following actions were taken to prevent accidents from similar shortcomings of supervision and procedures:

1. Written procedures were prepared covering functions involved in sulfur car unloading, and instructions were given to the employees involved.

2. The plant manager held a conference of directors, production supervisors and maintenance supervisors to emphasize, from this accident experience, the role of supervision in accident prevention.

3. A search was started for other situations where interface of organizational elements might be hiding work requirements that were inadequately covered by written instructions.

An AEC laboratory recently had two fires of electrical origin; each was extinguished by a single sprinkler head.

### Incident #1

A 60-Kilovolt capacitor was undergoing automatic charge and discharge cycles in a test bay during the night. It is believed that a defective connection began to arc, igniting an oil glass-cloth wrapping around a core counted on the capacitor. This burning wrapping acted as a wick, and, in turn, ignited cable insulation and plastics. The cycle counter stopped at 6:30 p.m., and the 208-volt breaker for the charging and triggering circuits tripped. The fire continued until 8 p.m., when it was intense enough to cause a sprinkler to operate. Damage and cleanup costs were estimated at \$700.

While, in this case, the electrical power was off when the sprinkler operated, it should be noted that the National Fire Protection Association Standard No. 15 prescribes a 23-inch clearance between fixed water spray systems and live electrical apparatus of 69,000 volts or less. (Water spray systems are similar to sprinklers.)

### Incident #2

The other fire was caused by a 115-volt 1.3-ampere laboratory stirrer motor (one of two) which stalled and ignited some foam rubber insulation surrounding a water bath. This, too, was an unattended operation, the fire occurring at 4:30 a.m. About five pounds of foam rubber and wire insulation were consumed before the sprinkler operated. Much of the damage cost was for cleaning and recalibrating a precision-resistance bridge. The electrical fault was not large enough to activate any overcurrent devices, and the second stirrer continued to run. It may be advisable to have unattended operations safeguarded with individual overcurrent protection sized to the particular apparatus, because branch circuit protection may be inadequate, as in this case.

A similar problem was mentioned in a previous newsletter of the laboratory:

"In past years, several fires have occurred from overheated baths or ovens due to the failure of single heat-control devices. Where a heat controller governs a sensitive or dangerous system, then two controllers should be used."



## TIRE FIRES

It was 6:30 a.m., near a small town in Texas. Most of the town residents were preparing to begin what they thought was another ordinary work day. Suddenly, the town was rocked by a tremendous explosion. Windows were shattered in almost every building in the town. Oil storage tanks were set ablaze. When the debris settled, it was learned that a truck loaded with explosives had caught fire and exploded. Luckily, no one was killed, although two firemen were injured. Property damage amounted to almost half a million dollars. An investigation disclosed that the fire which led to the explosion started from overheated tires on the explosive-laden truck.

The above incident, which actually occurred, emphasizes the enormous amount of property damage which can result from tire fires. Accident reports received by the Bureau of Motor Carrier Safety shown that tire failures and tire fires cause three times as much property damage as any other type of mechanical defect accident. During 1968 the Bureau received 394 accident reports concerning tire failures, of which 103 involved tire fires. These accidents resulted in 10 fatalities, 164 injured persons and \$2,110,757 property damage for an average of \$5,357 property damage per accident. It is easy to figure the amount of property damage in terms of dollars and cents. But how do we figure the cost of death or injury?

Tire problems of all types can often be avoided by examining and properly inflating tires prior to each trip and periodically checking them during a trip. An under-inflated or defective tire greatly increases the possibility of an accident or a fire. If you have a "hot tire," cool it down with water or remove the hot tire from the vehicle. Water should be used whenever possible as it both puts out the fire and cools the source of the heat. Stand ready to prevent a flare-up, even after a tire seems cooled down or a fire is put out. A "hot tire" should not be left unattended. Don't go for a cup of coffee while waiting for a tire to cool. Stay with your vehicle or there may be nothing left of it when you come back.

Recognizing the seriousness of tire fires, especially in conjunction with the transportation of hazardous materials, the Bureau issued a Notice of Proposed Rule Making on December 24, 1969, which would require periodic inspection of tires on a vehicle required to be placarded under the Hazardous Materials Regulations. Further, the notice proposes that when discovered, an overheated tire shall immediately be removed and placed at a safe distance from the vehicle.

## MOTORCYCLE RIDING RISKY

An individual involved in a motorcycle accident has a greater chance of being buried than one involved in an automobile accident.

That is the conclusion drawn from a study conducted by Navy CAP Bruce H. Smith, director of the Armed Forces Institute of Pathology (AFIP), and Navy LT Louis P. Dehner.

According to the study -- "Fatal Motorcycle Accidents of Military Personnel" -- motorcycles represent two per cent of the registered vehicles on the road, but are involved in 1.3 per cent of all vehicular accidents. They also account for 3.4 per cent of all fatal accidents.

The study went into detail on 219 motorcycle accidents resulting in 223 fatalities. The most common type of accident involved a single motorcycle with its driver as the victim. Excessive speed and loss of control on a paved roadway were the most common circumstances of a motorcycle accident.

Protective headgear -- required for motorcyclists in 36 states -- did not protect some of the victims. The study indicated that helmets showed a tendency to shift the injury site from the top of the head to the base of the skull. Chest and abdominal injuries caused many deaths, but in 80 per cent of the cases the victims suffered head injuries.

CAP Smith and LT Dehner concluded that the chances of surviving a motorcycle accident "may be enhanced if the potential operators are tested and licensed separately, laws on speeding and drinking are rigorously enforced and wearing of protective headgear and other protective gear is made mandatory.

They also recommended some type of light rigid vest as a means of reducing chest and abdominal injuries.

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ARADCOM Argus

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## EVERYONE FIGHTS FIRE AT JAAP

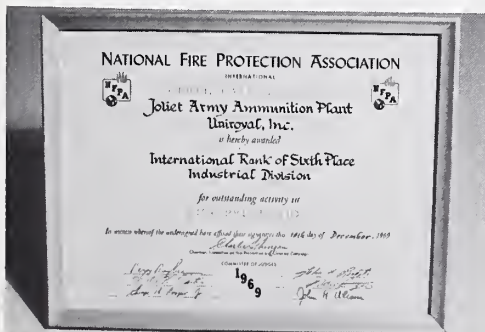
Harvey M. Haeberle, Safety Assistant  
Joliet Army Ammunition Plant

National Fire Prevention Week, October 5th through 11th, 1969, rounded out a year of successful vigilance against the threat of fire on the Joliet Army Ammunition Plant. The fire fighters of the plant contractor, Uniroyal, Inc., decided to get everyone involved in the activities being planned. They wanted to create some lasting impressions that people would carry with them throughout the year.

Portable displays were set up at key locations so pedestrians would have the opportunity to stop, look and ask questions about fire prevention. The two plant fire stations held open house. People were free to wander in, look the alarm systems and equipment over, and get a general orientation. Most of all, the fire fighters wanted to concentrate on promoting the logical first line defense against fire: the individual and the hand fire extinguisher.

This was a big order but an important one. Joliet Army Ammunition Plant is not only an active producer of explosives and munitions, but is also the home base of the Ammunition Procurement and Supply Agency. APSA alone employs some 2,300 individuals, mostly in large office buildings. This and an even greater number of people employed by the contractor pointed to a need for insuring that everyone know how to fight a spontaneous fire.

Fire drills were scheduled for all office buildings and work areas. When the people came out of the buildings and went to an assigned spot the fire fighters were ready with burning pans of gasoline. Instead of putting them out, they stepped aside and invited secretaries, foremen and bosses to take their turn in extinguishing the flames. People really got the feel of the extinguishers; they saw that a good shot of CO<sub>2</sub> really could put out a fairly large blaze.







When the week was over, the tally sheet showed the fire fighters had gotten to just about everyone. They recharged a lot of extinguishers during the week, but it was worth it. People would not be afraid to use them.

To cap off the year's fire prevention activities, the fire fighters compiled a pictorial and graphic record showing all phases of the plant fire protection program. It included notes on promotional activities, fire-fighter training, the inspection program, the organizational structure, as well as the all-important special precautions taken with regard to explosives and munitions. This record was sent to the National Fire Protection Association, Boston, Massachusetts, as an entry in the 1969 Annual Fire Prevention Contest. The entries were judged in January 1970, and Joliet Army Ammunition Plant, Uniroyal, Inc., placed sixth in a competing field of 125 companies from throughout the United States and Canada.

Everyone was proud of this achievement. A thorough, well-planned fire protection program is a pretty good measure of the ability to cope with actual fire problems. Best of all, the week's events gave everybody the chance to become familiar with fire. In fighting a fire the individual's best assets are a combination of respect and caution; his worst enemies are fear and panic. The Joliet Army Ammunition Plant fire fighters went all the way to get a lot of people on the winning side.

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## SPECIAL CAMPAIGN TO PREVENT UNSAFE ACTS

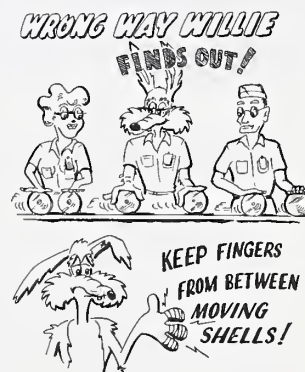
Ralph L. Bent, Safety Department  
Sperry Rand Corporation  
Louisiana Army Ammunition Plant

A special safety campaign was recently initiated at the Louisiana Army Ammunition Plant to prevent unsafe acts among our employees and to remind each individual of his safety responsibility, both to himself and his fellow workers.

To launch this campaign, a symbol, "Wrong-Way-Willie", was developed to identify unsafe acts. This symbol refers indirectly to the coyote in a popular cartoon series who never does anything in the right way and whose attempts to overcome the "good guy" always results in failure. It seems like each of his efforts is plagued by an unsafe act because every time he does the wrong thing he gets into trouble.

"Wrong-Way-Willie" resulted from the collaboration between Ralph L. Bent, Safety Department, who originated the idea, and Walt Fortuna, Industrial Engineer, who designed the symbol. Exploitation of "Wrong-Way-Willie" in conjunction with this campaign was accomplished in several unique fashions.

First, the program was kicked off and "Wrong-Way-Willie" was publicized in several editions of the plant newspaper, "Pel-I-Can". Second, an appropriate 3"X3" decal of "Wrong-Way-Willie" saying, "I goofed" was posted at each location where an unsafe act or standing operating procedure violation caused an injury or accident.



Third, locally designed safety posters were prepared, using "Wrong-Way-Willie" as the culprit or violator who caused accidents involving standing operating procedure violations or unsafe acts which occurred on the plant. Safety signboards were prepared locally, displaying "Wrong-Way-Willie"



and aimed toward the elimination of unsafe acts. These were posted at various locations throughout the plant. In addition, flags and banners were designed to emphasize the eradication of "Wrong-Way-Willie".

While it is difficult to measure the success of a special safety campaign of this nature, our improved safety record indicates that this program may have been a contributing factor. A comparison of accident experience six months prior and six months subsequent to the initiation of the campaign revealed that disabling injuries were reduced by 50 per cent and first-aid injuries by 23 per cent. Furthermore, the plant was presented the National Safety Council's Award of Merit on 11 February 1970 to commemorate the accumulation of over 2,000,000 consecutive disabling injury-free man-hours during the period of 25 November 1969 to 21 January 1970.

With the creation of "Wrong-Way-Willie" every attempt was made to assure that the mere sight of this unsavory character will remind each individual to work safely, follow the standing operating procedures and pay closer attention to his duties. All employees are continually encouraged to do their best to keep old "Wrong-Way-Willie" on the run and to be sure that this villain is not successful in causing an accident.

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## POISON PREVENTION

E. Ralph Coffman, Safety Officer  
Aberdeen Proving Ground

During the month of March 1970 the Aberdeen Proving Ground Safety Division was assigned the display window in Headquarters Building.

Since this was Poison Prevention Month, the display shown in the photograph was placed in the space. The purpose was to warn the viewers that common household items may be poisonous in the hands of children.

A round, 20-inch elevated table in the center was electrically actuated and rotated. The items on the table included Coricidin-D, Darvon, aspirin, iron tablets, calamine lotion, hydrogen peroxide, a prescription and lighter fluid.



Common household products displayed on the floor included spray-on cleaner, paint thinner, isopropyl alcohol, toilet bowl cleaner and a common kitchen drain cleaner.

At the left side of the display was a First Aid Manual, opened to page 49, showing common household poisons. On the left wing of the display a chart of instructions was displayed which explained what to do following the swallowing of a poison. On the right window was a chart showing poison plants and instructions to take following the handling of these plants.

This display attracted attention and caused many favorable comments.

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## FOOT PROTECTION

R. W. McDonough, Safety Department  
Sperry Rand Corporation  
Louisiana Army Ammunition Plant

Since August of 1968, employees of the Louisiana Army Ammunition Plant's Metal Parts Manufacturing Plant who work in areas requiring more than normal steel-toed safety shoe or boot protection have been furnished steel-toed safety boots with a hinged steel plate metatarsal protector.

A recent reevaluation of the use of this type of foot protection revealed:

1. Savings have resulted from elimination of the required frequent replacement of separate metal foot guards due to damage or loss.

2. The cost of the safety boots with attached metatarsal protection is less than safety boots with a separate strap-on metal toe guard placed over the toe and instep.

3. Employees prefer the safety boot with attached metatarsal protection because they are not as clumsy and/or cumbersome as safety boots plus metal foot guards.

4. The employee's feet are always adequately protected in contrast to those instances when he "forgot" to put toe guards on over his safety boots or shoes.

Three employees have received the Scarab Club Award. On one occasion the employee sustained a toe injury. In the other two instances, no injuries were experienced by the individuals. It was determined in each instance, the protection afforded by the foot protection the employees were wearing prevented serious foot injuries.

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# EXPLOSIVES

## SAFETY



# Explosives

## Safety

### EXPLOSIVES CONTAMINATION REQUIRES THOUGHT AND EFFORT

With increasing frequency, stories on man's pollution of his environment are carried by the press, television and radio. The recent experience of an electrician at an Army Materiel Command installation demonstrates that there is a sound foundation for some of these articles.

The worker was assigned the routine task of replacing a light bulb on the side of a building. He placed a ladder against the building, climbed up and replaced the bulb. He then started down the ladder and an explosion occurred.

Investigation revealed that the explosion may have resulted from a screw driver being dropped by the electrician. It apparently struck rocks or gravel that were contaminated by lead styphnate. The friction or spark initiated a flash, and a 3' X 2' hole was blown in the tile wall of the building. (See photo below)



Examination of the site led to the conclusion that the pressure wave went into and returned from the building. This indicated a possibility that the tile and mortar may have been contaminated sufficiently to continue the explosion initiation from the ground flash.

The worker received puncture wounds in both legs, arms, right hand, abdomen and face. Fortunately, these were so minor that first aid only was required.

His screw driver, with its handle discolored, was found in the immediate area.

The gravel-covered ground outside the building was contaminated. The contamination on the building was thought to have been the result of washing down with a hose after lead styphnate was dewatered. Contamination picked up by the stream of water could have splashed on the tile and mortar wall.

The installation took action to desensitize suspected contaminated areas around this and other processing buildings. As recommended by the manufacturer of the lead styphnate, a 25 per cent solution of sodium hydroxide was sprayed on these areas and allowed to set for two days to complete a reaction.

While the circumstances of this incident were unusual -- and no doubt disturbing to the worker who dropped his screw driver -- contamination is an old problem in the explosives industry. Many of the required safety practices for explosives manufacturing processes, such as good house-keeping, which has prevention or control of contamination as one of their main objectives. The possibilities and hazards of contamination are stated or implied in many of the paragraphs of the AMC Safety Manual, AMCR 385-224. Reminders of the hazards created by contamination are published in the Safety Digest and in Abstract Reports. (See "Contaminated Pipe Lesson Retought", September 1969.)

The following are precautions that should be practiced to cope with the hazards of explosives contamination:

1. Begin by making every practicable effort to eliminate the opportunity for contamination of your work environment. Explosive contamination is both hazardous and expensive. The present national policy is that government operations will not be permitted to pollute the environment.
2. Where equipment, vessels, pipes and processes are involved in explosives manufacturing, keep the materials and equipment used to a practicable minimum. This is also sound business, whether or not an explosive is involved.
3. Indoctrinate your workers in the hazards posed by explosives contamination. Make certain they understand the problem and the dangers.
4. Plan, clearly think out, publish and

distribute procedures to prevent and/or control the extent of contamination.

5. Through training, observation and inspection make certain these rules are obeyed.

6. Re-examine old rules and procedures to make certain that these are not creating new hazards. For example, a thorough washing down of a contaminated area may simply move the hazard from one spot to another. If you pick up an explosive dust in water, make certain a new hazard is not created by disposition of the contaminated water.

7. Control the subsequent movement and use of explosive contaminated materials, such as pipe. A system of marking of explosives contaminated items is necessary to accomplish this.

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## MAINTENANCE OPERATIONS AND EXPLOSIVES HAZARDS

Paragraph 1621, AMCR 385-224, prescribes safety precautions which must be observed when maintaining or repairing equipment which has been exposed to explosives.

Dependent upon the equipment involved and the nature of repairs to be effected, repairs may be performed with equipment "in place" or the equipment may be transferred to an inert shop area for repairs. Both circumstances introduce definite hazards from explosion and fire unless precautions are taken to prevent an occurrence.

In connection with the problem of exposure of maintenance men to unknown explosive hazards, it is worth repeating that the residue of nitrocellulose, high explosives and solid propellants remaining in hidden places in equipment have sufficient force to amputate hands and arms or even kill if accidentally initiated from the heat of welding and brazing torches and soldering irons, or from the blow of a hammer. Such accidents have happened from time to time.

When repairs are to be made on equipment "in place", the potential hazard is obvious since bolts and nuts, screw fittings and flanges provide openings of sufficient size to harbor explosives in quantities large enough to cause death or seriously injure personnel, and in some instances, initiate a larger and more disastrous explosion.

Established procedures must be in force to assure that contamination is completely removed prior to transferring equipment to an inert shop area. For making repairs and adjustments to explosives processing equipment or other items "in place", it is essential that all explosives contamination be removed or neutralized by competent personnel and, in addition, that the men making the repairs be instructed regarding the potential hazards.

Time will not be wasted and it has been accepted practice in the past for such proposed maintenance and repair operations to be the subject of joint consideration and approval by competent personnel of safety, explosives and maintenance sections prior to accomplishing the work.

If specific operations, it is required that nonsparking tools be used. If the maintenance personnel in repairing a machine where nonsparking items are normally required must use steel tools, not only shall the machine and surrounding area be cleaned but all explosive operations in the immediate area shall be discontinued to guard against accidental ignition of materials by flying sparks. When steel tools are used in maintenance operations, all contact surfaces should be oiled to reduce a potential spark hazard.

Prior to being placed into routine operations newly repaired equipment for use in hazardous operations must be examined and tested by competent personnel as an assurance that it is in safe working condition. If the equipment does not appear to function properly, operations shall be discontinued if the immediate stoppage does not create further hazards.

Aberdeen Proving Ground, Five Minute Safety Talk.



## ELIMINATE ACCIDENTS THROUGH HAZARDS CONTROL

James W. Whalin, Safety Assistant  
Atlanta Army Depot

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Disabling work injuries in the United States totalled 2.2 million in 1969\*. Of these, about 14,300 were fatalities. It is my belief that through a cooperative effort by both safety and management personnel these numbers can be reduced.

The reduction cannot be accomplished by management and safety alone. Reduction of deaths and disabling injuries requires conscientious and concentrated efforts toward safe work on the part of the workers themselves. This is the task to which we must direct our efforts -- we must establish a desire to work safely through training and retraining the workers in principles of safety, enforcing and reinforcing our safety regulations to establish their merit, and by engineering safety into and hazards out of their work processes.

A hazardous operation, machine, or entire process can be made non-hazardous through one of four ways:

1. Substitution
2. Isolation
3. Revision
4. Personal Protective Equipment

Substitution of less hazardous or nonhazardous operations, or the machine, seems to be the best method. This substitution may arise from new engineering standards which should be incorporated into the operation or process or availability of a new machine.

Isolation of machine, operation or process is an effective means of reducing the hazard. This can be accomplished in either of two ways:

1. Isolate the machine or process from the worker through guarding or by physically removing the operation from the vicinity of the worker.

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\*Accident Facts, 1969 edition, National Safety Council.

2. Isolate the worker from the machine, operation or process through use of protective barriers or physically by utilization of remote control devices.

Revision of existing machines and the like can be met in any number of ways. Revision could mean a change of process to obtain the same results. Revision may result by changing the steps a worker takes to complete the job. Revision approaches substitution in many ways, but the changes are made to the existing machine, operations or process rather than by a substitution of others for these.

Personal protective equipment is the least favorable method to make a machine operation or process less hazardous. In effect, nothing is changed relative to the hazard. It still exists. Personal protective equipment may prevent an injury or reduce the severity in the event of an injury, but by itself it can do nothing in the way of eliminating the hazardous condition.

Manual handling, working around hazardous chemicals, welding, and many processes require protective equipment. Every effort must be made to reduce the hazards encountered through one of the first three methods. Use of personal protective equipment is applicable only when used as a last resort or when used in conjunction with other methods previously described. Increased safety may sometimes be obtained only through use of combinations of these methods.

Safety, by means of the older and perhaps "dated" methods of hazards control, has progressed since its inception and adoption throughout industry and government. Systems analysis provides us with foresight into the area of accident prevention for the future, as opposed to the older method's hindsight, or learning by past accident experience.

While we have come not to a dividing line, we have come to a stage where the older methods, concepts and ideas must meet and intermix with the newer methods, concepts and ideas. This is a process of change. For those safety professionals whose outlook is realistic, it is an opportunity for progress.

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## ARMY ELECTRONICS COMMAND WINS NSC AWARD OF HONOR



MG Walter E. Lotz, Jr., Commanding General, US Army Electronics Command, is shown as he accepted the National Safety Council's top prize, the Award of Honor for 1969, from George Grotz of Wilmington, Delaware, the Council's regional representative. At right is Bernard M. Savaiko, ECOM Safety Director. In making the presentation Mr. Grotz remarked that ECOM won the top award for the second consecutive year, an unusual accomplishment for a major command.

## JOINT MILITARY PACKAGING TRAINING CENTER WINS AMC SAFETY AWARD OF MERIT

Mr. C. Y. Best, Director, Joint Military Packaging Training Center, Aberdeen Proving Ground, receives the AMC Safety Award of Merit for FY 1969 from COL Tom Kanelis, Chief, Training Division, Personnel and Training Directorate, Army Materiel Command, in a ceremony at the beginning of the DOD Packaging Advisory Group Meeting at Aberdeen Proving Ground.



JMPTC previously received the Award of Honor from the National Safety Council for an outstanding safety performance in FY 1969 and the APG Commander's Safety Award in Division II for the best accident prevention program in FY 1969.

## MANY HAZARDS CHALLENGE TO OFFICE SAFETY

R. B. Stedman, Editor, Sunflower Planet  
Hercules Incorporated  
Sunflower Army Ammunition Plant

Perhaps no other area at Sunflower Army Ammunition Plant is as potentially dangerous as the office. Whether it be in one of the area headquarters or the Administration Building, the office is traditionally the source of almost limitless hazard potentials.

Waiting to cause serious injury at the least display of carelessness are such "dangerous" items as filing cabinets, drawers, chairs, office machines, appliances, cords and sundry other items so commonplace their presence is taken for granted.





Some of the more common pitfalls that can be found are pictured here with the girls of the Sunflower Army Ammunition Plant Purchasing Department serving as models. It does not require too much imagination to envision countless other possibilities than those pictured.

As bizarre as it may seem, office accidents have caused such far-out injuries as the following:

✓ A neck injury from walking into an open filing cabinet drawer.

✓ A finger crushed in a spring-loaded typewriter desk shelf.

✓ A severe laceration from walking into a glass door.

■ Office safety cannot be overstressed. Each year work accidents occur from unexpected sources. Attention to the rule "safety first" is the only sure way to eliminate the potential for injury that can exist in an office.

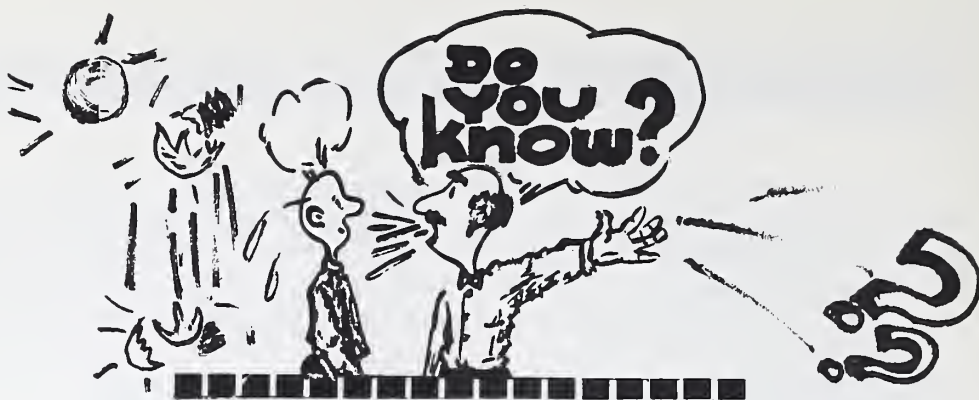
● Look around you. Bad housekeeping can create a problem. Stacking boxes, papers and other heavy objects on file cabinets, desks or window ledges can mean injury from falling objects.

● Fingers can be hurt on innumerable objects, and only caution can eliminate needless injury.

● Cords on the floor, footstools, boxes or file cabinet drawers left open invite tripping and falls.

Is your office really safe? Take stock today. Eliminate those hidden hazards.

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Here are ten questions that will test your knowledge of safety requirements that you will need under different circumstances. The answers to all of them may be found in AMCR 385-224. How many can you answer without referring to the regulation? The correct answers and references appear on pages 45 and 46

1. Who has the responsibility for detecting and correcting fire hazards, before work proceeds on new construction or modification of a building.

Answer and reference:

2. Where solid propellant is being collected from demilitarized rounds, how many pull-apart machines may be served by a common header on a vacuum collection system?

Answer and reference:

3. What is the maximum permissible surface temperature for lighting fixtures in atmospheres containing explosives?

Answer and reference:

4. Where should fire extinguishers be located on a government owned truck that is transporting a cargo of explosives?

Answer and reference:

5. If ammunition or explosives are to be detonated in a pit, how shallow should it be?

Answer and reference:

6. What is the minimum width for the top of a barricade that exceeds 20 feet in height?

Answer and reference:

7. How close may cylinders of oxygen be stored to an area used for storing flammable gases?

Answer and reference:

8. What is meant by the term "intermediate storage"?

Answer and reference:

9. May infrared ray drying processes be used in a room where exposed explosives are present?

Answer and reference:

10. What special article of clothing should be worn by an individual who is working with finely divided magnesium or aluminum?

Answer and reference:

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THEY SEE HOW IT IS DONE



As part of their training the Safety Career Management Intern trainees become familiar with the principal types of operations at selected AMC installations. In the photo a group from the AMC Field Safety Agency Class No. 5 is shown at Aberdeen Proving Ground.

During FY 1971 the students participating in the AMC Safety Engineering Graduate Training Program will make training visits to obtain technical and background information.

## AUTOMATIC MAN-HOUR COUNTER SHOWS INJURY-FREE TOTAL



The employees of Radford Army Ammunition Plant are constantly reminded of their accumulation of injury-free man-hours by means of a recently installed electronic man-hour counter. Shown with the automatic counter, when it registered 6,582,340 man-hours, are Mr. J. C. Foster, Hercules Incorporated Plant Manager, and LTC R. J. Douglas, Commanding Officer.

The man-hour counter consists of a modern electronic digital type counting device which activates lighted numbers on a large, easy-to-read board. The counters are positioned at each plant entrance so that personnel can see at a glance their safety record and continuous man-hour accumulations as they enter and leave the plant.

At Radford Army Ammunition Plant, the safe man-hours worked record is not a cold impersonal statistic, but denotes an individual's performance which contributes to the Safe work environment. This dynamic display graphically shows the employee that his individual achievement is a meaningful part of the plant.

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**Well,**

**did you know?**



Here are the answers to the questions on pages 42 and 43 . All questions were based on information contained in AMCR 385-224. A reference to the pertinent paragraph follows each answer.

1. The Fire Marshal should be responsible for reviewing plans for installing equipment, construction of new buildings, modification of existing buildings or installations, changes of work processes, and fire main systems and for detecting and correcting fire hazards before work proceeds. Reference: Paragraph 1205.
2. The common header connected to the primary collectors of solid propellant materials should not serve, or be connected to, more than three pull-apart machines. Reference: Paragraph 2505c.
3. Lighting fixtures in atmospheres that contain explosives dust must not exceed a maximum surface temperature of 228°F. (109°C.) when operating in an ambient temperature of 80.6°F. (27°C.). Reference: Paragraph 614b.
4. One extinguisher is required to be mounted on the outside of the cab on the driver's side and a second inside the cab. If the truck is equipped with an interior carbon dioxide flooding device, only one extinguisher should be carried. Reference: Paragraph 2205d.
5. When ammunition or explosives are to be detonated in a pit, the pit should be not less than four feet deep. The material to be detonated should be covered with not less than two feet of earth. Reference: Para 2717a.

6. Barricades in excess of 20 feet in height will have a minimum width of not less than five feet at the top. Reference: Paragraph 1725a.
7. Storage areas for oxygen cylinders should be separated by not less than 30 feet from areas used for storing flammable gases. Reference: Paragraph 1320a.
8. The term "intermediate storage" refers to the temporary storage of materials at machines, workbenches and other process locations throughout an establishment. Reference: Paragraph 912.
9. Infrared ray drying process should not be used in the same room in which exposed explosives are present. Reference: Paragraph 1209a.
10. Sweatbands should be worn when necessary to avoid perspiration falling on finely divided magnesium or aluminum, which may be ignited by moisture. Reference: Paragraph 1010.

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#### REFERENCE PUBLICATIONS

AR 40-13 Medical Services - Radiological Emergency  
3 Mar 70 Medical Teams (REMT)

AR 385-10 Safety - Army Safety Program  
17 Feb 70

AMCR 385-6 Safety - Motor Vehicle Seat Belts  
Ch 1  
30 Dec 69

DA Cir 385-24 Safety - Safe Operation of Truck, Utility,  
30 Jan 70 1/4-Ton, 4 X 4, M151 Series

DA Cir 385-25 Safety - Training for Army Safety Personnel  
18 Mar 70

DA Cir 75-1 Explosives - Surface Shipment of Explosive  
12 Jan 70 Ammunition in Commercial Containers.



# DEPARTMENT OF DEFENSE HUMAN GOALS

Our nation was founded on the principle that the individual has infinite dignity and worth. The Department of Defense, which exists to keep the nation secure and at peace, must always be guided by this principle. In all that we do, we must show respect for the serviceman and civilian employee as a person, recognizing his individual needs, aspirations, and capabilities.

The defense of the nation requires a well-trained force, military and civilian, regular and reserve. To provide such a force we must increase the attractiveness of a career in Defense so that the serviceman and the civilian employee will feel the highest pride in himself and his work, in the uniform and the military profession.

## THE ATTAINMENT OF THESE GOALS REQUIRES THAT WE STRIVE ...

To attract to the defense service people with ability, dedication, and capacity for growth;

To provide opportunity for every one, military and civilian, to rise to as high a level of responsibility as his talent and diligence will take him;

To make military and civilian service in the Department of Defense a model of equal opportunity for all regardless of race or creed or national origin, and to hold those who do

business with the Department to full compliance with the policy of equal employment opportunity;

To help each serviceman at the end of his service in his adjustment to civilian life; and

To contribute to the improvement of our society, including its disadvantaged members, by greater utilization of our human and physical resources while maintaining full effectiveness in the performance of our primary mission.

*William P. Sand*  
SECRETARY OF DEFENSE

*David Packard*  
DEPUTY SECRETARY OF DEFENSE

*Earl J. Walsh*  
CHAIRMAN, JOINT CHIEFS OF STAFF

*John A. Ryan*  
SECRETARY OF THE ARMY

*John H. Chafee*  
SECRETARY OF THE NAVY

*Robert C. Sumner*  
SECRETARY OF THE AIR FORCE

*William C. West*  
CHIEF OF STAFF, U.S. ARMY

*Thomas H. Mott*  
CHIEF OF NAVAL OPERATIONS

*John D. Ryan*  
CHIEF OF STAFF, U.S. AIR FORCE

*David C. Bagley*  
COMMANDANT, U.S. MARINE CORPS



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